IOT BASED SMART WASTE MANAGEMENT

[1].Y.Kumari.[2,]K.Durga Bhavani,[3]. B..N V L .Nikhila, [4].D,Gowri Kusuma, [5].K,Swapna.
[1].Assistant professor, [2,3,4,5] students . Department of Electronics and Communication Engineering Potti sriramulu Chalavadi Mallikarjuna Rao College of Engineering and Technology , Vijayawada.
Email:kumarinvsr@gmail.com,bhavani97ece@gmail.com,nikhilabolisetty132@gmail.com, gowrikusuma.d@gmail.com,swapnakatikala41@gmail.com

Abstract: In present days garbage is a big issue if it is not disposed properly. With the increased concern about the waste collection, segregation, effective re-utilization and pollution free environment there is a need for TECHNOLOGY to tackle the situation. Something has to be done regarding the issue. Timely disposal and segregation of waste into dry and wet before dumping into bins is implemented using NodeMCU(Microcontroller Unit). As soon as the bin is filled, it should be brought to the notice of municipality department so that it can be taken to garbage monitoring plants before the bins are covered with flies, rodents, most importantly before it smells foul polluting the city environment.

Keywords:NodeMCU,Sensors,Smartcity ,Garbage,ThingSpeak

INTRODUCTION:

We are living in an age where tasks and systems are fusing together with the power of IOT to have a more efficient system of working and to execute jobs quickly! With all the power at our finger tips this is what we have come up with. The Internet of Things (IoT) shall be able to incorporate transparently and seamlessly a large number of different systems, while providing data for millions of people to use and capitalize. Building a general architecture for the IoT is hence a very complex task, mainly because of the extremely large variety of devices, link layer technologies, and services that may be involved in such a system. One of the main concerns with our environment has been solid waste management which impacts the health and environment of our society. The detection, monitoring and management of wastes is one of the primary problems of the present era. The traditional way of manually monitoring the wastes in waste bins is a cumbersome process and utilizes more human effort, time and cost which can easily be avoided with our present technologies. This is our solution, a method in which waste management is automated. This is our IoT smart waste management system, an innovative way that will help to keep the cities clean and healthy.

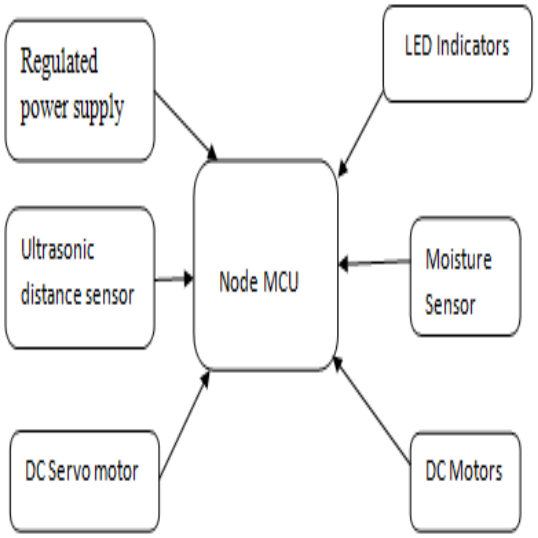
THE PROBLEM:

Nowadays, there are tons of flats and apartments which have been built in the rapid urbanization area. This is due to high housing demands which have been drastically risen as a result of migration from villages to cities to find work. In order to accommodate the growing population in the urban area, the government has also constructed more apartment complexes. There are several issues faced by the residents of the flats. One of them is disposal of solid waste. Unlike private houses, the residents of all the apartments use a common dustbin, which tends to fill up very quickly. This overflowing of garbage is a sanitary issue which might cause diseases like cholera and dengue. Moreover it is a waste of fuel to travel around a complex or an area to find that some of the garbage are filled and some are not. Also, on rare days, problems might arise that there is so much garbage that the truck doesn't have enough capacity. The idea struck us when we observed that the garbage truck use to go around the town to collect solid waste twice a day. Although this system was thorough it was very inefficient. For example let's say street A is a busy street and we see that the garbage fills up really fast whereas maybe street B even after two days the bin isn't even half full. This example is something that actually happens thus it lead us to the "Eureka" moment.

BLOCK DIAGRAM:

The smartest, easiest, cleanest and simplest waste management can be achieved through smart bin concept. Intelligent Monitoring is the IoT solution that is revolutionizing how Smart Cities and private companies service their container assets. Presence of Optimistic logistic resources which reduces collection and delivery costs by up to 50%.This self responsible work of environment concerned citizens makes life easier for workers of municipal corporation. This method also avoids spreading of diseases, breading of mosquito and other rodent's .The outlook of the city also improves with this approach, builds healthier environment, healthier citizen's, beautiful surroundings Our bin is designed for each apartment's use, the compounder gets alerts from different apartment to collect the waste regularly so that it doesn't stink and the garbage is disposed properly even if the apartment owner is busy or out at work etc. Our module consists of ultrasonic sensor fitted on to the inner side of bin cap, protected from waste. These sensors can actually sense the waste that in the bin, sensor delivers message regarding different aspect of sensor. Ultrasonic sensor notifies the level of bin, i.e. whether the bin is filled or not depending on which

the compounder decides to empty it. These sensors data is then sent to thing speak, data analytics will be accessible to compounder, the data is sent to his mobile phone via mobile app where there is different indications him to empty that particular bin by led's.



FLOW CHART :

Sensors values are loaded depending on height. All the sensors values are sent to thingspeak via Wi-Fi module and the values can be visualized through graph. The values in thingspeak are sent Android app where if the ultrasonic value is greater than maximum value. If the sensors don't exceed their maximum value then it will check for sensor values again.

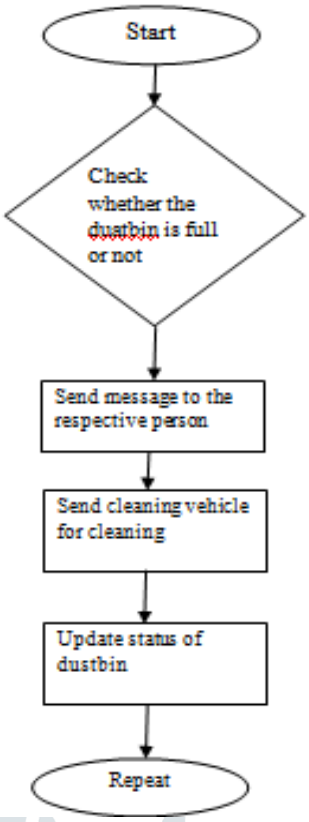


Figure : Flow chart of project

What our system does it gives a real time indicator of the garbage level in a trashbin at any given time. Using that data we can optimize waste collection routes and ultimately reduce fuel consumption. It allows trash collectors to plan their daily/weekly pick up schedule. An Ultrasonic Sensor is used for detecting whether the trash can is filled with garbage or not. Here Ultrasonic Sensor is fixed at the top of Trash bin and will measure the distance of garbage from the top of Trash bin and we can set a threshold value according to the size of trash bin. If the distance will be less than this threshold value, means that the Trash bin is full of garbage and we will print the message

"Basket is Full" on the graph and if the distance will be more than this threshold value, then we will print the distance remaining for the garbage vat to be full.

IMPLEMENTATION:

Waste management can be broadly categorized as: collection and transportation. The bins will be fitted with ultrasonic sensor to detect the level of garbage collected and moisture sensor to sense the moisture content in the garbage for wet and dry separation process. Indicators like LEDs will be used for notifications. The sensors will be interfaced to NodeMCU that will collect the sensor data and send it to ThingSpeak cloud where the data will be collected. Based on the data collected, the maintenance person of that apartment gets a message. The message displays the levels of bins, so that he can be alerted to collect the garbage. DC motors are fixed to the bin with the arrangement of wheels inside the bin to crush the the garbage in order to make partial compost inside the bin.

Fig.1-PROTOTYPE MODEL

Fig:2-PTOTEUS FOR VACANT BIN INDICATED WITH GREEN LED

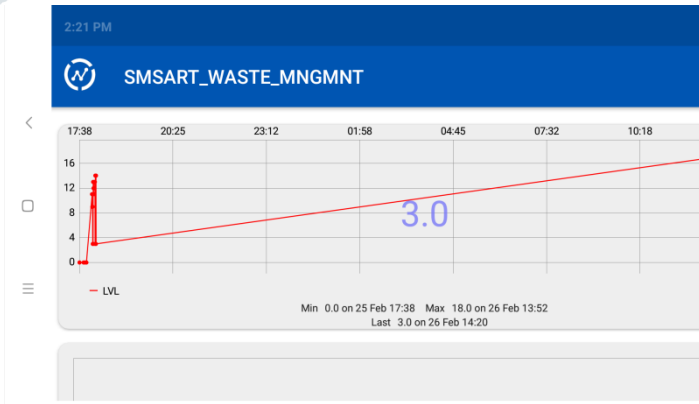


Fig:3-GRAPHICAL REPRESENTATION OF VACANT BIN

Fig:4-PTOTEUS FOR MINIMUM LEVEL DUST INDICATED WITH YELLOW LED

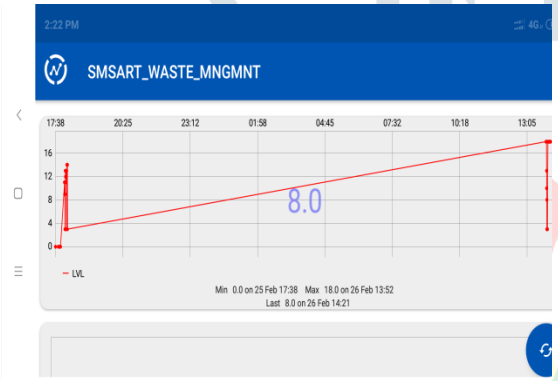


Fig:5-GRAPHICAL REPRESENTATION OF MINIMUM DUST BIN

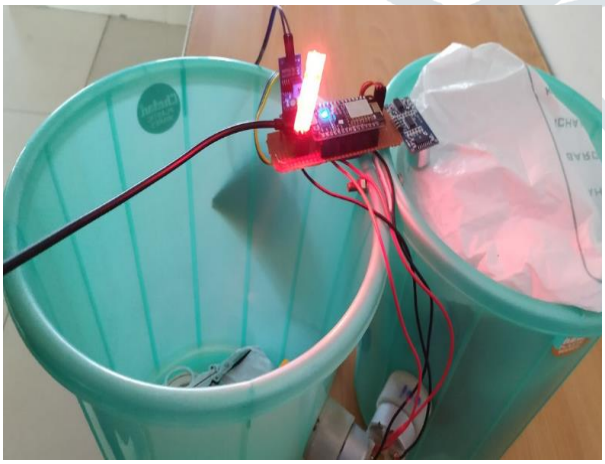


Fig:6-PTOTEUS FOR EXCEEDED DUST IN BIN INDICATED WITH RED LED

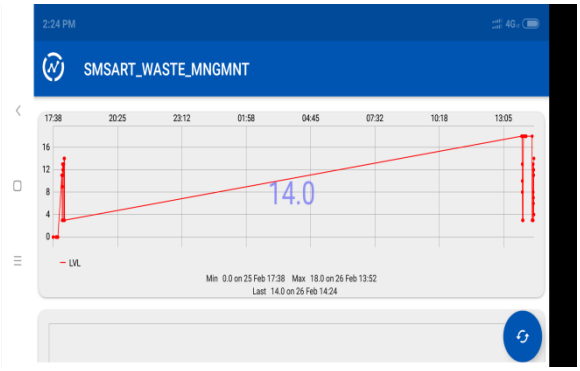


Fig:7-GRAPHICAL REPRESENTATION OF EXCEEDED DUST BIN

CONCLUSION:

We built an efficient waste management system which can be used to monitor the level of garbage in the dump. This data can be further used to plan garbage collection trips more efficiently, ultimately reducing overflowing bins and helping have better public sanitation.

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